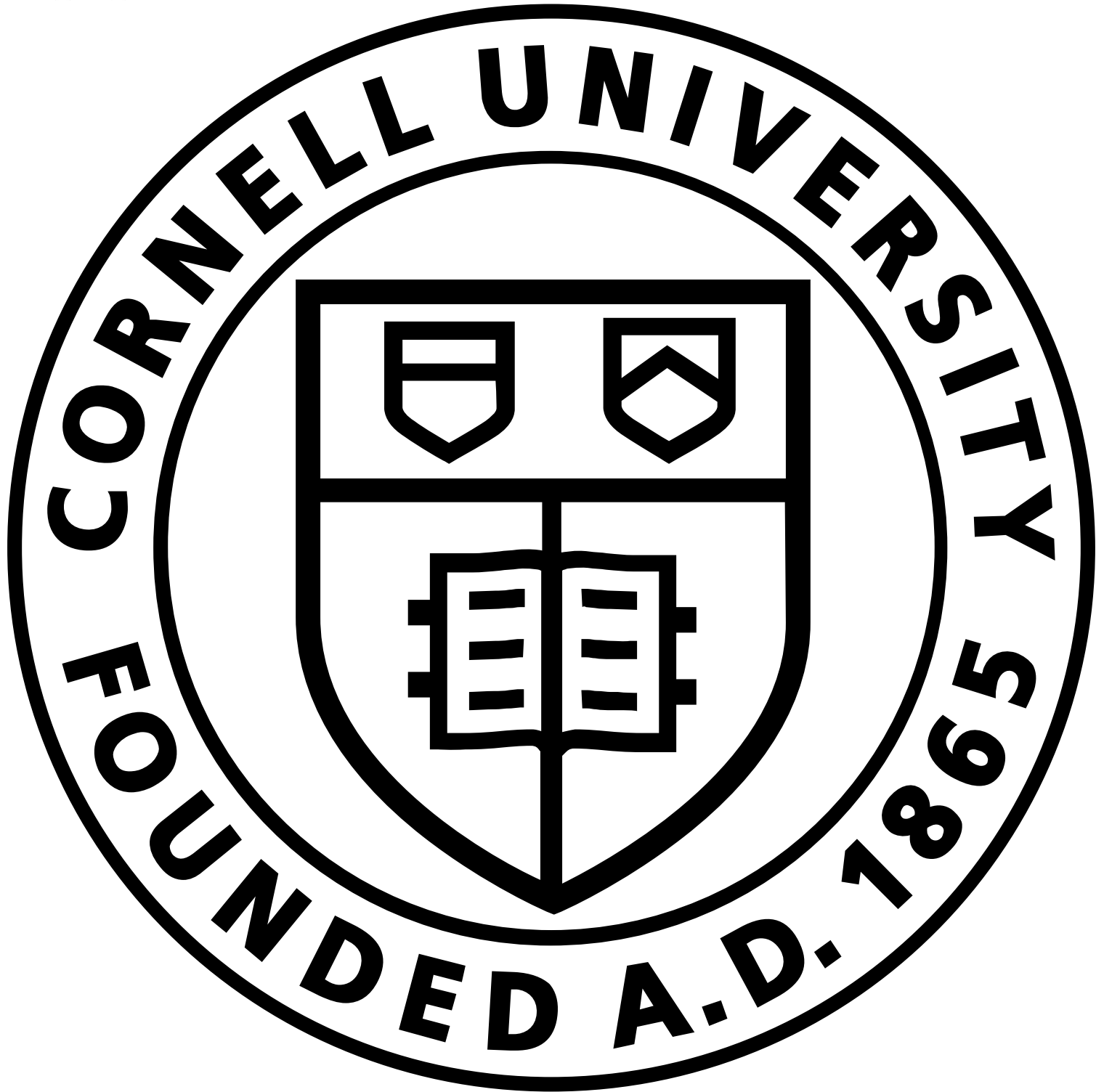


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Gamma-ray observations of Tycho's SNR with VERITAS and Fermi

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High-energy gamma-ray emission from supernova remnants (SNRs) has provided a unique perspective for studies of Galactic cosmic-ray acceleration. Tycho's SNR is a particularly good target because it is a young, type Ia SNR that is well-studied over a wide range of energies and located in a relatively clean environment. Since the detection of gamma-ray emission from Tycho's SNR by VERITAS and Fermi-LAT, there have been several theoretical models proposed to explain its broadband emission and high-energy morphology. We report on an update to the gamma-ray measurements of Tycho's SNR with 147 hours of VERITAS and 84 months of Fermi-LAT observations, which represents about a factor of two increase in exposure over previously published data. About half of the VERITAS data benefited from a camera upgrade, which has made it possible to extend the TeV measurements toward lower energies. The TeV spectral index measured by VERITAS is consistent with previous results, but the expanded energy range softens a straight power-law fit. At energies higher than 400 GeV, the power-law index is $2.92 \pm 0.42_{\text{stat}} \pm 0.20_{\text{sys}}$. It is also softer than the spectral index in the GeV energy range, $2.14 \pm 0.09_{\text{stat}} \pm 0.02_{\text{sys}}$, measured by this study using Fermi-LAT data. The centroid position of the gamma-ray emission is coincident with the center of the remnant, as well as with the centroid measurement of Fermi-LAT above 1 GeV. The results are consistent with an SNR shell origin of the emission, as many models assume. The updated spectrum points to a lower maximum particle energy than has been suggested previously.

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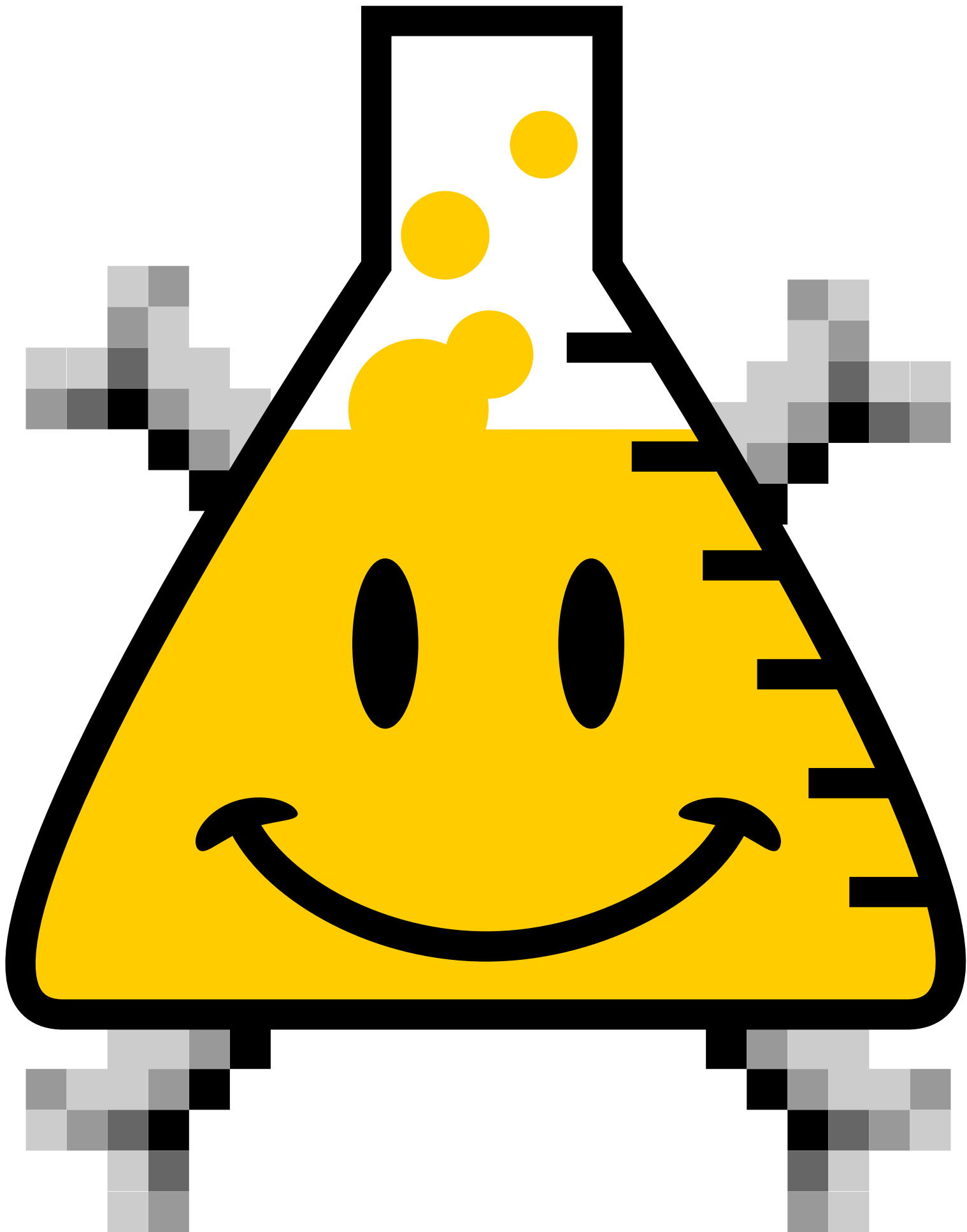
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